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Grumman To Upgrade F-111 Avionics For USAF

Grumman and teammate TRW will update navigation and communication system of 152 planes including EF-111As

The Aircraft Systems Division's EF-111 Program is alive and well, rejuvenated by the recently awarded Avionics Modernization Program (AMP) contract from the U.S. Air Force.

Grumman and teammate TRW will update the navigation and communication systems of 152 General Dynamics F-111As, F-111Es and Grumman EF-111As. The five-year contract is worth approximately $109 million and is with the Sacramento Air Logistics Center in Sacramento, California.

"Grumman had never been awarded a contract from the Sacramento Air Logistics Center," says Vern Kramer, EF-111 program vice president. "However, we were optimistic about winning this contract. Once again, it shows that teamwork pays off."

Under the Air Force contract, Grumman and TRW will develop and manufacture AMP kits. The major work involves writing computer programs for the communication, inertial navigation, attack and terrain-following radar equipment. Grumman will also incorporate the Global Positioning System, a satellite-based navigation system that will tell the crew exactly where they are.

How The Pieces Fit. *Engineers Stanley Stolov (L) and Erick Koch discuss the arrangement of the F-111 Avionics Modernization Program's electronics. Grumman Aircraft Systems Divisions won a major Air Force contract to update the communication and navigation equipment of 152 F-111's. (Photo by Jim Wagner)*

Some General Dynamics-developed software will be modified by Grumman and TRW. Software development will be performed in Grumman's Laboratory Integration Mockup in Melville, New York, and at TRW's facilities in Dayton, Ohio, and Sacramento.

Except for hardware needed during the development phase, all hardware will be purchased by the Air Force.

Grumman plans to install the first kit in an F-111E in January of 1988, perform functional check flights, then turn the updated plane over to the Air Force for a year of flight tests. The company expects to deliver the first production kit for the F-111Es in December 1988. At that time, Grumman will install the first EF-111 prototype kit and test it. F-111A installations will be done last.

The Electronics Systems Division will assemble the kits.

In winning, Grumman beat General Dynamics, the manufacturer of the F-111 fighter/bombers. "Our current experience modifying F-111As into EF-111's gave us a lot of confidence," says Ralph Siegel, AMP program manager. In that program, Grumman had literally taken apart 42 F-111A aircraft, rewired them and fitted them with electronic warfare equipment.

Confidence, though, didn't make the waiting any easier. From the time Grumman submitted its proposal on May 31, 1985, mum was the word from the Air Force. "On most proposals, you usually hear rumors about how you're doing," says Kramer. "There were absolutely no rumors on this one." ■

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Sweet Toothed Squadron. *Grumman packed plenty of microchips into this EA-6B electronic warfare aircraft. However, the crew needs more chocolate chips to fly its daily missions over the Mediterranean Sea. VAQ-137, led by Cdr. Roy Christian, is assigned to the* U.S.S. Saratoga. *Like to send them a few of your special oatmeal-raisin delights? Address the package to: Mr. Ron Payne, Grumman Representative, VAQ-137, FPO San Francisco, California 96601-6421. (AP/Wide World Photos)*

Open Invitation To Party Boaters: Grumman's Got A Pontoon Boat

Let the party begin. Grumman Boats' new Funship line of pontoon boats is now being shipped to dealers around the country.

Called party boats, pontoon boats are basically platforms mounted on a pair of 21-inch-diameter, aluminum floats. They're used mainly on inland waterways for leisure boating.

"For the past several years, our dealers have been asking us over and over to offer a line of pontoon boats," says Bob Steinway, general manager of this Allied Division unit.

The Grumman Funships are available in lengths of 20, 24 and 28 feet. Customers can also order any one of five furniture package options.

According to Steinway, the 24-footer with the top-of-the-line appointments will go for around $7,000 – including motor and trailer. That price puts it at the lower end of the price scale in the pontoon boat market.

However, the pontoon market is tough to break into. About 20,000 pontoon boats a year are sold in the United States. The top brand is the BassTracker, which made about 9,000 party boats last year. Steinway says Grumman hopes to sell 1,000 Funships in its first year.

Grumman Boats aims to provide a top quality pontoon boat at competitive prices. "For instance," says Steinway, "we'll give the customer 21-inch floats at 19-inch prices. These larger floats give the customer more capacity. Then there are technical aspects, such as our all aluminum construction which doesn't rust versus galvanized steel which does."

So far, the Funships have attracted quite a bit of attention at boat shows around the country. When the prototype was shown at the Little Rock Boat Show, nine were sold by a Grumman boat dealer. That may not seem like many, but most prototypes don't sell at all because their finishes aren't up to production standards. "Since that show, the dealer held an open house and sold 36," Steinway says.

All production will be done at Grumman Boats' Arkadelphia, Arkansas, plant. Steinway says that 15 people have been added to the workforce there to help get the new line running. That number could rise to 30 when production gets into full swing. ■

Summer Jobs '86

Summer employment application forms for dependents of Grumman employees in all divisions are available at all Employee Services offices and in the Employment office in Headquarters. Application deadline is Tuesday, April 8.

Summer employees must be active, full-time students who have completed at least one year of college by the summer of 1986, who are not graduating this June, and who are continuing their education full-time in the fall towards an associates' or bachelors' degree.

This year's program begins May 27 and ends August 29. Students are expected to work at least a minimum of eight weeks. Summer positions are limited. Selections are based on the parent's years of company service, student interest, and availability of job openings. Applicants will be notified by the beginning of May. Mail applications to: Employment, C07-GHQ.

For additional information, contact Renee Cox, Ext. (111) 59385; or Pete Portanova, Ext. (111) 50683.

Obituaries

Robert V. Allison, Sub-Assembly, Aircraft Systems, Bethpage, died Jan. 31 at the age of 61. He had been with the company since 1965 and resided at 36 Kansas Ave., Bay Shore, N.Y.

William T. Gallagher, ILS Auto Circuit Analysis, Aircraft Systems, Melville, died Jan. 27 at the age of 61. He had been with the company since 1952 and resided at 47 Kent St., Farmingdale, N.Y.

Raymond L. Swanson, Honeycomb Layup and Bond, Aircraft Systems, Milledgeville (Ga.), died Feb. 3 at the age of 42. He had been with the company since 1983 and resided at 2873 Nowell Dr., Macon, Georgia.

Retiree Obituaries

Theodore Baumann of 143 Bennet Ave, New York, N.Y., died Sept. 24, 1985. He retired in 1974.

Anthony M. Cove of 5 Gables Blvd., Setauket, N.Y., died Jan. 27, 1986. He retired in 1985.

Joseph T. Diaz of 14221 Nambe Ave. NE, Albuquerque, New Mexico, died Jan. 30, 1986. He retired in 1979.

Robert H. Fortin of 2594 Yorktown St., Oceanside, N.Y., died Feb. 5, 1986. He retired in 1983.

Gilbert W. Griffiths of 160 Avon Pl., Amityville, N.Y., died Jan. 25, 1986. He retired in 1977.

Frederick Groll of 44 Warwick Pl., Pt. Washington, N.Y., died Jan. 20, 1986. He retired in 1980.

James O. Hanratty of 40 Gamma Dr., Las Vegas, Nevada, died Jan. 14,1986. He retired in 1966.

John M. Morris of Oak Hills, Baiting Hollow, Calverton, N.Y., died Jan. 29,1986. He retired in 1978.

Henry A. Mugits of 350 Del Sol Ave., Indialantic, Florida, died Feb. 1, 1986. He retired in 1973.

John J. Phillips of 7000 26th St. West, Vero Beach, Florida, died Jan. 4,1986. He retired in 1971.

Anthony Scipione of 1683 Kroll Rd., East Meadow, N.Y., died Jan. 20,1986. He retired in 1984.

Anthony Sidonio c/o Minder, RFD 1, Box 115, Dover-Foxcrof, Maine, died Feb. 7,1986. He retired in 1985.

The Backbone Of A Wing

Grumman must use two huge Ingersoll routing machines to cut titanium into F-14 wing stringers.

Operator Jim Cathey follows a template to cut tabs along a length of titanium. The Ingersolls are equipped with one-quarter inch cutters, and must use freon as a coolant.

There are 58 different types of stringers in one set of F-14 wings, ranging from three to 22 feet in length. They come in a variety of thicknesses, too. Cathey and co-worker Joe Nuzzo produce about 5,000 stringers in a year.

"Stringers are a critical fatigue part, and have to be made to exacting specifications," says Cathey. "Once the rest of the wing is built around it, a stringer can't be removed."

Stringer production is an early step in the long, detailed process of making an F-14 wing, all of which takes place in Bethpage's Building 3. Completed F-14 wings are painted and tested there, then shipped to Calverton for final assembly.

Let Us Know

We don't want to do all the talking.

We'd like to know what you think about the things you see in these pages, and what you see going on in the company. Serious comments, questions and complaints are welcomed, and will be answered by the people most qualified to respond. We'll get back to you promptly with their replies. If the topic is of general interest, we'll print it.

Letters to the editor should be addressed to *Grumman World*, 1111 Stewart Avenue, A22-GHQ, Bethpage, N.Y. 11714, and should include your name and address. Letters may be edited for clarity or space.

The Bids Are In; Grumman Awaits Word From Rolls-Royce

Data Systems competing against British firms to build test system for Rolls-Royce

Grumman Data Systems recently shipped a package to Rolls-Royce in Bristol, England. The contents: a proposal to design and install a new computerized test system for Rolls-Royce aircraft engines.

Winning this contract would spell multimillions in business for Grumman. It would also add an international flavor to the Grumman work force, since most of the work would be done in England by British employees.

Rolls-Royce is a premier manufacturer of aircraft engines. Its top models are the RB211-524 which powers the Boeing 747 and Lockheed Tri-Star jumbo jets, and the RB199 for the NATO Tornado and the next-generation European Fighter Aircraft.

The Grumman proposal was delivered on February 7 and Rolls-Royce will announce the winner on March 21.

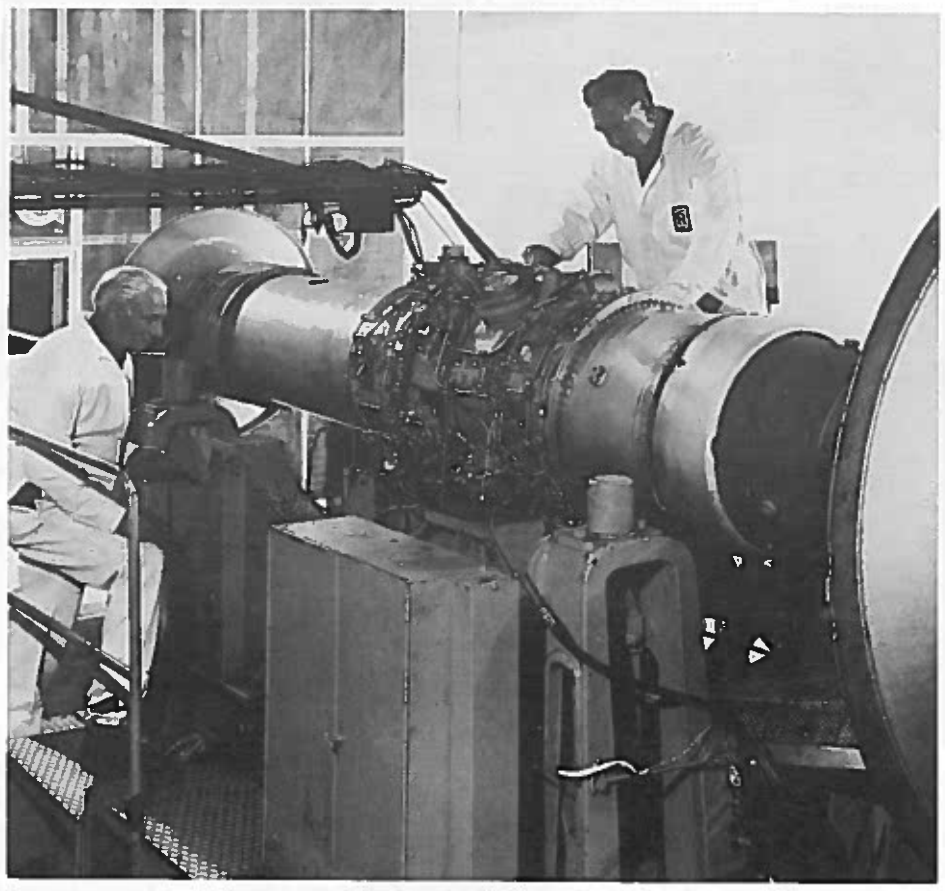
"We have designed and installed more test systems of this kind than any other company," says Data Systems President John O'Brien. "The Rolls-Royce sale is critical to our continued success in the market. And the contract will certainly make Data Systems more visible in Europe than it has been."

The proposed system is known as the ADR-3 – which stands for Automated Data Reduction system, third generation.

"About 55 people would work on the program at its peak," says Charlie Schiano, program director. "At the most, a dozen Grummanites from the U.S. would temporarily relocate to England. The rest would be new hires. The mix of jobs would include computer system designers, instrumentation specialists, test engineers, computer programmers, operators, and other specialists."

The phase-one contract is for preliminary design of the system, and will run approximately a year. Phase two, the proof-of-concept, will extend two years beyond that. The third phase will be full scale development and installation of the system.

ADR-3 is part of a multimillion-dollar capital improvement program at Rolls-Royce, which also includes investments in computer aided design and manufacturing, computerized factories, and robotics. Rolls-Royce,



Mark Of A Leader. *Rolls-Royce is one of the premier manufacturers of aircraft engines. Its top-of-the-line RB211-524 powers the Boeing 747 and Lockheed Tri-Star jumbo jets. Recently, Grumman's Data Systems Division turned in a proposal to design and build a new engine test facility for Rolls-Royce.*

General Electric, and Pratt & Whitney dominate the aircraft engine business. Furthermore, demand as heated up – airlines are re-engining older jetliners instead of buying brand new ones.

Rolls-Royce plans to spend between $30-40 million on the ADR-3 program, but that's not final yet. Rolls-Royce has asked bidders to be flexible, to suggest several system options – for example, a choice between a distributed or centralized system. Rolls-Royce will then determine what it wants, and that will have some effect on the price tag.

Military engines are tested at Rolls-Royce's Bristol complex, in the west of England near Wales. Commercial engine testing is at Derby in the industrial midlands. There are 15 test cells at each site.

A test cell is where an engine is hooked up to instrumentation and tests are run to verify the design. Test cells are used for just one or two engine components, or for the entire prototype powerplant. In engine testing, an enormous number of measurements must be made, and it's a slow, painstaking process.

One of Rolls-Royce's goals is to cut development time. Currently, it takes five years to develop a new engine. Rolls-Royce aims to cut that down to two years – and the ADR-3 system will help it do that.

These are all *ground* engine tests. Rolls-Royce has a separate flight test center with its own data processing system, which will not be linked to ADR-3. Eventually, however, the company does want to hook ADR-3 up to test groups in its Marine and Helicopter Divisions.

The system will be somewhat like Grumman's Automated Telemetry System in Calverton, which gathers data on aircraft performance during flight tests. Another related Grumman-built computer installation is the Test Instrumentation System at the U.S. Air Force's Arnold Engineering Development Center in Tullahoma, Tennessee.

Grumman has designed about 20 other systems of this type, which offer real-time data. "Real time" means information is displayed almost instantly during tests. The alternative is batch or near real-time processing, which is still in use at Rolls-Royce. Both are much more time consuming and lengthen the process.

"Rolls-Royce also likes Grumman's engine interface unit concept," Schiano says. "Each of Rolls-Royce's 30 test cells operates independent of the rest, until the final stages. There aren't the proper communication links. There is also some duplication."

In the summer of 1984, Grumman received a $300,000, eight-month study contract to produce a requirements document for Rolls-Royce, spelling out what the test engineers would need from a computerized test system.

At Rolls-Royce's behest, Grumman gave not only technical advice, but advised Rolls-Royce on how to reorganize its testing groups – from the top on down.

The other bidders are all British: Logica, System Designers, CAP, and the Software Sciences division of Thorn-EMI. The first three are respectively, the number one, two, and three software firms in England.

If it wins this and subsequent phases of the Rolls-Royce contract, Grumman will open a development facility in England at a location to be determined. ■

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ABCs Of Requisition Forms Changed By Services Division

Material requisition forms are used at Grumman to purchase everything from a 39¢ pencil to a $2,000,000 F-14 inlet nacelle. As of March 1, the manually prepared "A" and "B" requisition forms will be changed.

The old "A-Reqs" for indirectly charged items, and "B-Reqs" for directly charged items, will be replaced with a new single "C-Req" form. Direct charges are those that are applied to the budget of a particular program, whether contract funded or Grumman Corporation funded. Indirect charges, on the other hand, are applied to the budget of a particular group.

The new form will go into use on March 1; the old forms will not be accepted after May 1. The new "C-Req" form will be used by every Grumman division except Allied. Due to the commercial nature of its business, Allied will continue to use its own forms.

Over 70,000 manually prepared requisitions are processed each year. "That makes these forms one of the most used at Grumman, next to timecards and group insurance claims," says Carl Drewry, deputy director of finance and planning for Corporate Procurement in the Services Division.

Information from the new "C" form will be entered into the procurement computer system, enabling Grumman to keep better history and visibility of item costs. Grummanites will get faster answers when they call to inquire about orders. In most cases, the new system could result in getting orders processed quicker.

Drewry points out that, as always, the originator should make sure the form is filled out with the highest degree of accuracy, legibility, and completeness. "It's just like ordering something from the Sears catalog," he says. "If you leave off a piece of information, you'll get the order back with a form letter telling you it was filled out wrong. If your information is wrong or illegible, you'll receive the wrong item."

If you're confused, you may refer to a new instructional book that has been distributed to all corporate policy manual-holders. Management Systems and Procedures has extras – if you need one, call Bill Fleischhauer at Ext. (111) 53677. ■

New Assignments

In the Data Systems Division, Ed Offenhartz has been appointed director of Business Development. In addition, division treasurer Joe DiGiacomo will assume responsibility for the management of Data Systems capital.

John Carr: Integrity Is His Hallmark

How would John Carr like to be remembered at Grumman? "Years ago, when Lew Evans was president of Grumman, he would introduce each person in the room at his management meetings. I was general counsel at the time. Lew would say, 'John Carr. He is the conscience of the company.' I was very flattered. I like that label. I would like to be remembered that way."

John Carr retired in December as vice chairman of Grumman, after a career of 30 years. He will continue his association with Grumman as a consultant.

His association with Grumman began as a young Navy fighter pilot flying Hellcats, Wildcats, and Avengers in the Pacific during World War II. "In those days, being a fighter pilot seemed a lot more thrilling than flying bombers straight to a target," says Carr.

When he started work in the company's legal department in 1955, it seemed to him that the company only hired ex-Navy fighter pilots – of Grumman planes. With a grin, he adds, "Grumman's gotten a lot more ecumenical over the years."

In 1960, Carr was appointed general counsel. Six years later, he was elected corporate secretary and remained in that position when the company was restructured into Grumman Corporation in July 1969. The following year, he was elected a corporate vice president.

From 1960 through 1972, Carr was the company's general counsel. In December 1972, he assumed the responsibility for administration of the parent company. In May 1976, he was elected to the board of directors and two years later, vice chairman.

He had directed the activities of Grumman's Washington, D.C., office since 1981. He will remain in Washington as a member of the law firm Zuckert, Scoutt, Rasenberg & Johnson.

But his new office has a Grumman phone book on the desk, and an X-29 scale model on the coffee table; 30 years pack a lot of memories. Along the

'I always felt there was a solution short of bankruptcy. Something would turn the tide.'

way, there were plenty of minor legal battles and a few major crises.

"I think the settlement of the F-14 contract in the early '70s was the most serious legal battle I was ever involved in. Those were tough days," he says. "The banks had shut us off, and the Senate voted to stop our advance payments. We were just squeaking by."

Because of high inflation and cutbacks in the original procurement projections, Grumman was unable to build the F-14s for the agreed-upon price.

In March 1973, the Navy and Grumman worked out an agreement: the company would build the first 84 F-14s under the original contract, and future Tomcats would be built under a new pricing schedule.

"Hindsight would say maybe there were other ways to solve the financial problems," said Carr. "The final method was very tough. We took a staggering loss. However, I always felt there was a solution short of bankruptcy. Something would turn the tide."

Howard Dunn, corporate vice president of Audit, says that Carr is at his best in a crisis. "One of his greatest attributes is being able to keep people calm," says Dunn. "John never allowed himself to become emotional or excited, and that helped the people around him to keep their heads."

Carr's management style was low-key. Grumman International President Mike Pelehach says, "He's Will Rogers. He believes in the soft sell. He would discuss things quietly with you, and then give you terrific advice. But most of all, he was concerned for the company: he wanted Grumman to do the right thing."

One of Carr's biggest contributions was in making the company more visible in Washington. "John added a welcomed dimension to the Washington office," says Grumman Secretary and Vice President Bob Bradshaw. "Senators, congressmen and the executive branch respected his judgement and integrity."

In 1981 when Carr arrived in D.C., there was a new adminstration in the White House and many people in Congress – excluding members of the Armed Services committees – were unfamilar with Grumman.

"We had to basically start from scratch with the new administration. We were not as well known

'Many people on the Hill and in the Pentagon had obsolete notions of Grumman.'

as other defense firms. Many people on the Hill and in the Pentagon had obsolete notions of Grumman," says Carr. "They remembered the F-14 problems from 10 years earlier and hadn't kept track of Grumman's progress. We were viewed as a Navy contractor . . ."

During his first year in D.C., Dallas-based LTV Corporation made an unsuccessful attempt to take over Grumman. "LTV turned into a break," he recalls. "Grumman became very well known . . . network television coverage . . . full page ads in Washington Post. The publicity helped get me into a lot of places on the Hill. It did an awful lot to enhance Grumman's interests."

The takeover attempt would have been put to an immediate halt if Grumman had in 1981 the resolutions that shareholders approved at last year's annual meeting. "A substantial number of Fortune 500 companies have adopted similar defensive measures in their bylaws and charters," says Carr.

"To Grumman's credit, some of the things put in as defensive measures were not designed to entrench the management but to make sure all the shareholders got the same break if there was a tender offer," he adds. "It's the practice of many corporate raiders to come in and buy 50 or 51 percent of the company. Then, they give the shareholders of the remaining 49 percent a much lower offer. LTV might have had that in mind; it originally tendered for far less than 100 percent. Grummanites would have gotten the short end.

"That's not possible anymore," adds Carr. "Under the new conditions, every shareholder gets the same amount, if there was a merger. Of course, you need a super majority to approve the merger."

Telling the Grumman story in Washington involves more than getting exposure in trade journals and newspapers. Carr says that Grummanites in the Washington office have made strides in getting the word out about the company both in the Pentagon and on the Hill. "Compared to other defense firms, we work at it harder, because we have farther to go," he says.

Individual Grummanites are assigned to keep track of the needs of present or potential customers – from the Armed Services to NASA to the Postal Service. In addition, Grumman can call on its team of seasoned political consultants. "Nowadays," says Carr, "we are at the stage where we can get access to tell our story at any place we want."

Carr believes that the change in the election laws that allowed the formation of a Political Action Committee (PAC) has helped open doors, too. With the emergence of PACs, Carr says, "you don't have individuals making contributions of $75,000 like you did in the early '70s. A low ceiling has been set: five thousand dollars per candidate every campaign from a PAC. That makes a big difference," says Carr. "PACs are legitimate ways for groups of people with common concerns to meet and work together."

He voices even stronger views of the deficit-reducing Gramm-Rudman law which requires a balanced federal budget by 1991. Every year, the Gramm-Rudman law sets deficit ceilings. Each year that lawmakers fail to meet those targets, automatic

budget cuts will be taken in hundreds of government programs.

"If it is invoked, unquestionably it's going to lead to smaller defense budgets. Unless there is a drastic improvement in our nation's economy, the U.S. will not catch up or keep up with the Soviets as it has done in the last four or five years. Gramm-Rudman is a self-imposed unilateral disarmament; it will have devastating effect on our nation's defense."

Working in the Washington office has given Carr an opportunity to view the government process up close. "Since I've been here, I've dealt with many high quality, intelligent people. However, I've found that it's the system that just doesn't work. The process has become very slow. There are too many splinter and pressure groups that can stop the action. For instance, take the recent change in defense procurement. Instead of improving the system, it is making it more difficult, and more costly for both sides. And it is not going to achieve the benefits it was established to do."

With procurement practices under scrutiny, open competition, and tighter budget constraints, Grumman and the entire defense industry are facing

'Senators, congressmen and the executive branch respected his judgement and integrity.'

challenging problems in the near future, points out Carr. "The trick is to be able to make a profit. The squeeze is going to come. There will be less money to spread around. The pressure is going to be on contractors."

Carr is cautiously optimistic about Grumman's future. "There aren't many aircraft contracts coming along in the next decade or so," he says. "We've been fortunate with the A-6F and F-14D development contracts. They will give us airframe business for years to come. However, those two programs are more involved with electronics than airframes.

"Right now, we've got to get our electronics business well established," he adds. "In the area of electronic test equipment, we're becoming one of the foremost contractors in the country."

Carr notes that most of Grumman's electronic systems are military-oriented. "As we get more deeply into this field, we'll find more commercial applications in this field. As time goes by, there will be opportunities.

"However, that's downstream a good many years. We have to be very patient. I don't think it's going to happen in the next three or four years. I'd be interested to see what Grumman looks like 10 years from now."

Reflecting on his Grumman career, Carr says, "The opportunities were tremendous. It's a wonderful company. I've met people whom I'll regard as my best friends as long as I live." ■

Look Out, Aussies!
Grumman Joins Team To Bring Home America's Cup

Charlie Boppe enjoys having cold water splashed on some of his ideas.

Boppe and fellow Grummanites Joe Laiosa and Bruce Rosen are helping the Sail America Foundation design its entry in the America's Cup challenger trials in the hope of wrestling the cup back from Australia. All three work in Aircraft Systems' Aerodynamics Department in Building 35, Bethpage.

The job is perfectly suited for these three aerodynamicists. Mathematically, the wing and fuselage of a plane and a boat's hull and keel follow the same intricate rules of fluid flow.

Physically, Boppe, Laiosa and Rosen follow some tough rules, too. All their work is done after hours and on Saturdays, as part of a agreement between Grumman and the foundation.

"Sometimes we'll work through lunch just to get a jump on our work for the evening," says Boppe. "Each of us spends about 20 to 25 hours per week on the project. We are excited about this, but we're also getting tired – so are our families."

No wonder. Boppe says they've been sailing along at this pace for the last 14 months, and there's plenty of work yet to do. "Really, there's no final end date set. Any of the boats we build can be modified."

These boats are the X-29s of the sea – advanced racing sloops that conform to the "12-meter" classification.

The category name "12-meter" is the product of a complicated, 70-year-old mathematical formula. With a little multiplication and division of measurements such as the boat's length, sail area and how much water it displaces, the answer has to equal 12 meters.

These yachts race for one prize: the America's Cup. In the pre-12-meter yacht days, it was called the Hundred Guineas Cup. That's what it cost Britain's Royal Yacht Squadron. The cup was the prize to the winner of the 53-mile race 'round the Isle of Wight in 1848. In 1851, Queen Victoria watched the famous schooner *America* defeat 14 British boats. And the cup moved to The Colonies.

Smooth And Swift *Subtle is the difference between the 12-meter yacht* Liberty *(foreground) and* Stars & Stripes '85, *one of the new yachts built to compete for the America's Cup. They are practicing off the Hawaiian Islands, where the conditions resemble those near Perth, Australia, the site of next year's races. The Sail America Foundation races* Liberty, *the runnerup to* Australia II *in the 1983 races, against its new boats to measure their performance. Grumman aerodynamics experts have helped design the below-the-waterline shapes of the foundation's three boats.*

America's owner and the founder of the New York Yacht Club, John Cox Stevens, eventually donated the cup to the club. The club owned it until the 12-meter yacht *Australia II* took the cup down under in 1983.

A lot of money is being spent in six nations by the 14 current cup challengers to take the cup from the Aussies. The non-profit Sail America Foundation, probably the most ambitious of the contenders, has already raised $8 million of the $15 million budget it needs to muster its fleet.

In addition, the foundation boasts Dennis Conner, the most experienced America's Cup skipper of all those prepping for the challenger trials later this year. The Cup races will take place in 1987 in Perth, Australia.

The foundation has already put three boats in the water to test their concepts. *Stars & Stripes '83* is the former *Spirit of America* with a new hull. *Stars & Stripes '85* and *'86* are brand new 12-meter yachts built in Mamaroneck, New York. Construction will start on a fourth boat, *Stars & Stripes '87*, next month.

"The boats cost about $400,000 to build," Boppe explains. "Most of the money is being spent in design."

The value of high-tech designs was emphasized by the victory of *Australia II* in 1983. Thanks to a rule change, the Australians were permitted to go outside their own borders for design help for the '83 races. "The Aussies went to the Dutch government agency that does aerospace research and development – similar to NASA," says Boppe. "They also used some American technology: winglets developed by Richard Whitcomb of NASA."

Australia II's keel with wings made it unbeatable in 1983. "In December 1984, we got a call from the foundation," Boppe adds. "They said, 'Could you help out?'"

Sail America already knew of Boppe who had earlier worked with one of its naval architects, Britton Chance, who designed the Intrepid in 1973. Sail America needed Grumman's computerized fluid flow modelling skills.

"The programs we use for wing design can be used to simulate the flow around the keel," Boppe says. "The computer work weeds out different concepts and fine-tunes certain elements of the boats without resorting to a lot of tank testing of models, which is very expensive," says Boppe. That's not to say that computer time isn't. "We are into calculations now that are extraordinarily expensive."

Till now, the Grumman team has been using the company's Cray supercomputer to do its calculations. Grumman has done about $100,000 in business just on its computer services. Recently, Cray Research, the manufacturer of the computer, joined the Sail America team, offering computer time free-of-charge on its most advanced machine, the $15 million X-MP/48. This machine is in Minnesota. The Grumman crew uses it over telephone lines from their terminals in Building 35 in Bethpage.

From what most landlubbers see of these America's Cup yachts, they all look alike. It's what's underwater that is really different. And that's a secret.

Boppe, Laiosa and Rosen can't talk about it. "We've all signed confidentiality agreements," says Boppe. "We can't talk about our designs." Boppe will show a visitor the computer-created graphics of the hull of Australia II while it's underway. He won't show graphics of what they've done for Sail America.

But their work is now being put to the test in sea trials in the waters off Snug Harbor, Hawaii. "That's where the conditions most resemble those off Perth, Australia, where the Cup races will be held," says Boppe.

"There are dramatic differences between the three boats. What we're trying to come up with is the maximum lift-to-drag ratio to give the boat speed."

Every day, one of their three designs is sailing against another foundation-owned boat, *Liberty*. *Liberty* is the 12-meter yacht Conners sailed in the 1983 America's Cup loss to winged-keel *Australia II*. Racing against *Liberty* has proven that their designs aren't all wet. "We're beating *Liberty* by distances that far exceed what *Australia II* beat it by." ■

Secret Weapon. *What the Australians don't see in next year's America's Cup races may hurt them. The Sail America Foundation entry's secret weapon may just turn out to be the work of Grummanites Charlie Boppe (seated), Bruce Rosen (L) and Joe Laiosa. As Grumman consultants to the Foundation, they're lending their aerodynamic skills to design what's under the water line. They won't give away any secrets. (P.S. The computer-graphic photo on the desk is not of their design. It's the keel of Australia II, the 1983 cup winner.) (Photo by Bob Settles)*

Employee Services: Still Lending A Helping Hand

Back in World War II, Employee Services was set up to help Grummanites solve those nagging little everyday problems. If you left your medicine on the kitchen table, Employee Services would run home and get it. If you forgot to renew your gas ration coupon, Employee Services would wait on line and get you a renewal.

Cynics will murmur "those were the good old days." Several gas crunches have come and gone since, but Employee Services hasn't changed much. It still offers Grummanites a helping hand – and it still makes house calls.

That's what Employee Services is all about, says manager Chet Baumgartner. "We are here to help."

For instance, after Hurricane Gloria pulled the electric plug on Long Islanders last year, Employee Services came up with a good deal on portable generators to combat future outages. "The gas-powered generators normally run about $1,400, but we bought them in bulk and sold 960 generators for only $600," says Baumgartner.

Employee Services operates 13 Flight Shops on Long Island and helps supply similar shops at other Grumman sites. Off Long Island, Stuart Operations in Florida offers the best supply of Mohawk items in the world. At the Long Island shops, you can purchase an assortment of Grumman paraphenalia – from Tomcat T-shirts to Grumman plane models to flight jackets. "The popularity of these items has really grown," says Baumgartner. "Business over the last two-and-a-half years has better than tripled."

Flight Shops also carry a variety of gift items – a good point to remember if you forgot your spouse's birthday. The shops also carry seasonal specials: orchids for Mother's Day, candy for the Easter Bunny, suntan lotion in the summer, and chapstick in the winter.

Also available at all Flight Shops are the services of a notary public, lost and found, film processing, company benefits forms, income tax forms, and job postings.

If you become sick at work, an Employee Services rep will take you to the doctor's office or hospital. Don't worry about your car. Employee Services will drive it home for you.

If a family member needs a wheel chair, crutches or a cane, you can borrow these items. Employee Services reps will visit you when you're sick at home or in the hospital and help you complete forms for medical claims and disability insurance. They'll even send you flowers or a basket of fruit.

If there is a death in a Grumman household, Employee Services is there with consolation and help. They'll send flowers in the company's name. They'll provide guidance and the necessary transportation to a deceased Grummanite's family when they need to check on benefits or handle affairs at the Credit Union.

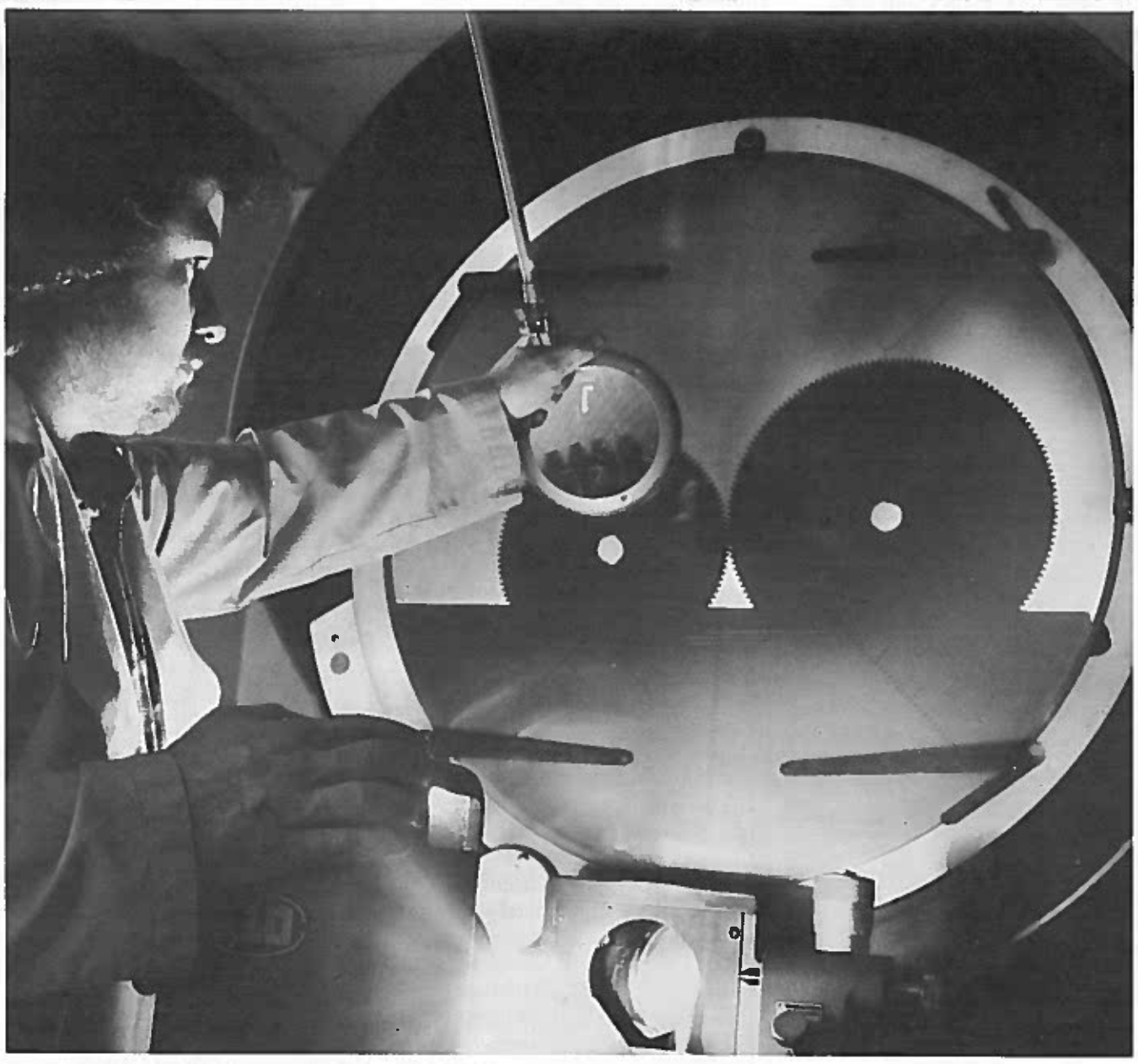
To The Rescue. *When a Grummanite is ill and needs to get home, Haywood Hammond and other members of the Employee services team are there to give a lift. (Photo by Bob Settles)*

The best known of Employee Services' activities is the motor vehicle license and registration renewal service for Long Islanders. In fact, Grumman is a pioneer in this area. It is the only entity licensed to act as an agent for the Department of Motor Vehicles of New York State.

Grummanites can visit offices in Headquarters, Great River, and Melville, to get their New York State photo ID licenses. A new office in Calverton opens next month.

You can still walk into your local Flight Shop and arrange for an ES rep to get an auto sale form processed at the State's motor vehicles offices. "For the registration renewal, we recommend that people take the forms to their local Flight Shops to speed things up," says Baumgartner. "We'll return the registration the following day."

If you have any questions about Employee Services, call Ext. (111) 53391. ■



Plenty Of Teeth, But Does It Bite? *Using this shadow graph comparator, Dave Beal measures a new set of gears in the First Inspection Room in Central Receiving, Building 24 in Bethpage. In this building, the technicians inspect parts purchased from suppliers. Using the comparator, they can accurately make measurements of the enlarged – up to 100 times – shadows or reflected images of parts.(Photo by Bob Settles)*

GE Revving Up New F-14 Engines

The first General Electric F110-400 engine which will power the Grumman F-14A + is undergoing tests this month at G.E.'s Evendale, Ohio, plant. After the tests, it will be shipped to the Naval Air Propulsion Center in Trenton, New Jersey, for altitude performance, operability and functional testing.

The F110-400, a version of the engine that powers the Air Force F-16, will begin flight tests in August. The Navy is scheduled to release the design for production in October. G.E. plans to deliver the first engine for a production F-14A + to the Navy in July 1987.

Personals

My daughters and I wish to express our sincere appreciation to all my friends, co-workers, and ESO for their kind expressions of sympathy during the recent loss of my wife Jean. **Stan Meiselman**

My family and I wish to thank all of our friends at Grumman and ESO for their thoughtfulness and sympathy during the recent loss of my mother. **Donald Nuttall**

My family and I wish to express heartfelt thanks and appreciation to our co-workers, friends and ESO for their expressions of sympathy during our recent bereavement. **Gary & Sheila Bigel**

Your concern and words of encouragement made my recovery from surgery that much quicker and I'm grateful for your kindness. It's great to be back. **John Schenna**

We sincerely appreciate the expressions of sympathy extended during our bereavement. **Miriam L. Reid and the Vergie Webber Reid Family**

L. Appleman

E. J. Campbell

N. N. Christensen

R. H. Diem

G. Dreimann

A. W. Engelhardt

S. J. Goebel

M. R. Horn

W. T. Johnson

D. E. Karcher

R. A. Latour

F. T. Mancilla

K. T. McSweeney

J. J. Miglionico

H. M. Morse

K. W. Payne Jr.

G. F. Pflugel

J. Piccione

H. Saul

E. N. Stern

A. P. Tyler

D. R. Wiggin

C. F. Wright

D. Zaleski

Service Milestones

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Jerome Barfus, Mgmt./Staff, Great River, Electronics
Joseph N. Wittko, Pwr. Plt. & Environ. Staff, Bethpage, Aircraft

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Richard W. Barthelme, Land. Gear Carrier, California, Aircraft
Harry A. Bush, Invent. Mgmt., Great River, Electronics
Rocco J. Cessario, Sys. Test/Flt. Integ., Bethpage, Aircraft
Harry A. Colli, Maint. Admin., Bethpage, Services
Edward A. Cramer, St. Augustine, Aircraft
Genevieve Dellysse, Personnel Lia., Melville, Aircraft
Robert B. Englert, ATF, Bethpage, Aircraft
Raymond E. Jeffrey, F-14 Joining, Calverton, Aircraft
Lawrence A. Jesberger, Prod. Supv., Great River, Electronics
Richard C.LaFantano, Parts Paint, Bethpage, Aircraft
Bernando E. Martins, Crew Sys., Bethpage, Aircraft
Walter D. Moule, Mach. Insp., Bethpage, Aircraft
Gene J. Pinelli, Mech. Des. Staff, California, Aircraft
John M. Rigsby, Crew Sys., Bethpage, Aircraft
Norma Rooney, Secretary & Personnel, Bethpage, Grumman Corp.
John R. Seadon, Tool Eng., Stuart, Aircraft
Michael A. Strazay Sr., Gov't. Cont., Bethpage, Aircraft

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Robert Albert, Prod. Cont., Great River, Electronics
Arthur O. Baldwin, Transportation, Bethpage, Services
John A. Barclay, Mach. Insp., Bethpage, Aircraft
John J. Bardenhagen, Prod. Supervision, Bethpage, Aircraft
Edward W. Beckett, Mech. Detail & Fin., Great River, Electronics
Ellison L. Brem, Detail, Bethpage, Aircraft
James Brown, Maint., Bethpage, Services
Robert T. Byrnes, Mat'l. Mgmt., Bethpage, Aircraft
Edward F. Cantrell, Sci. & Tech. Sys. Appl., Calverton, Data Systems
Frank E. Carlin, Rec./Shipping Insp., Calverton, Aircraft
Nicholas F. Dannenhoffer, Adv. A/C, Bethpage, Aircraft
John L. DeSandre, Elect. Mech. Lines, Melville, Aircraft
Francis X. Drumm, M&ME Mgmt., Bethpage, Aircraft
William P. English, Mat'l. Ops., Calverton, Aircraft
William T. Flatley, Elect. Lab. Mgmt., Calverton, Aircraft
Frank Genova, Inv. Rel. & Cont., Bethpage, Aircraft
Richard Halley, Adv. Prog., Melville, Electronics
Clarence W. L'Hommedieu, Mat'l. Mgmt., Stuart, Aircraft
Patrick T. Jennings, A-6/EA-6B Teardown, Calverton, Aircraft
Walter Kohlhoff, Propulsion Sys., Melville, Aircraft
Roald L. Larsen, Cent. Rec., Bethpage, Aircraft
Alan C. Lofsten, Welding Grp., Bethpage, Aircraft
Frank G. Mazzella, Equip. & Supply, Bethpage, Aircraft
William J Monahan, Mfg. Sch., Bethpage, Aircraft
Eugene L. Mouquin Jr., Veh. Lia., Bethpage, Aircraft
Jean G. Pailet, Eng. Ops. Mgmt., Bethpage, Aircraft
William P. Paulik Jr., Conf. Data Mgmt., Melville, Aircraft
Anthony J. Rizzi, Mach. Shop, Calverton, Aircraft
William G. Roche, Elect. Bench Assy., Calverton, Aircraft
Harold F. Sanders Jr., Tech. Ops. Mgmt., Milledgeville, Aircraft
John Sidorski, Elect. Test, Bethpage, Aircraft
Frederick H. Softye, ILS Train. Sys. Eng., Bethpage, Aircraft
John P. Stewart, Parts Paint, Bethpage, Aircraft
Bruce R. Stiefel, CTR Sect.-Sub-Assy., Bethpage, Aircraft
Boyd Stowell, Grumman Boats, Marathon, Allied
Nils R. Tegner, Struct. Design , Bethpage, Aircraft
Karl H. Thoma, Photo Lab, Calverton, Services
Reginald E. VonRhee, Op. Product Mgmt, Bethpage, Data Systems
James E. Whelan, Prototype, Bethpage, Aircraft
Arthur J. Young, Product Reliability & Analysis, Bethpage, Aircraft

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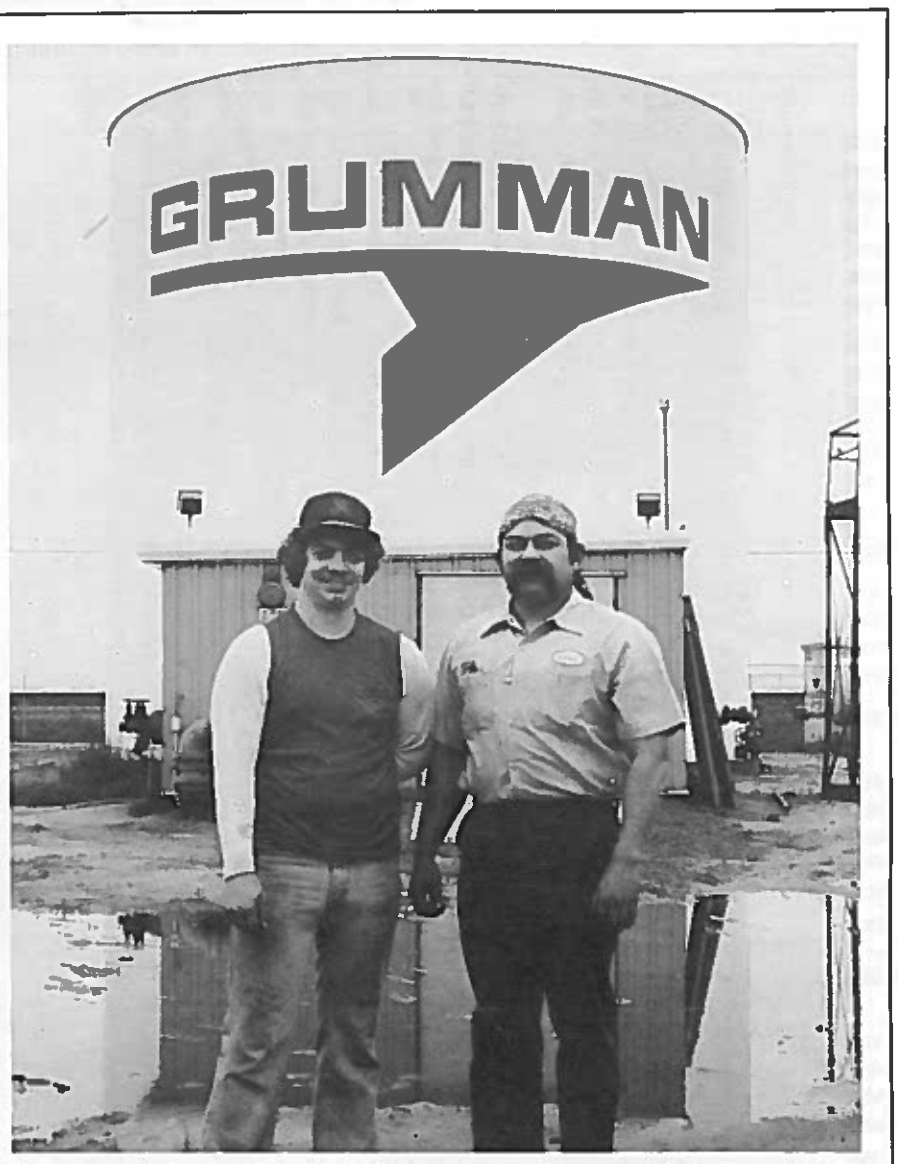
Howard C. Ahders, Software Sys. Mgmt., Bethpage, Aircraft
Louis Appleman, ILS Des. Eng. Mgmt.,Bethpage, Aircraft
Joseph A. Burkowsky, ILS Data Sys., Melville, Aircraft
Edward J. Campbell, Production, Pt. Mugu, Aircraft
Charles A. Catalano, Tech. Reqmts., Bethpage, Aircraft
Norman N. Christensen, ILS Tech. Writing, Bethpage, Aircraft
Raymond H. Diem, Support, Calverton, Aircraft
Donald J. Dinger, Joining F-14, Calverton, Aircraft
George Dreimann, F-14 Struct., Calverton, Aircraft
Clifford P. Dugan, Instr. Test, Calverton, Aircraft
Alfred W. Engelhardt, Avion. Sys. Test, Great River, Electronics
Scott J. Goebel, ILS Pubs. Cont., Bethpage, Aircraft
M. Richard Horn, Logist. Supt., Melville, Electronics
Wesley T. Johnson, Wt. Optim. & Tech. Dev., Bethpage, Aircraft
Duncan E. Karcher, Nav. & Cont. Equip. Des., Bethpage, Aircraft
Robert A. Latour, Flt. Avionics, Calverton, Aircraft
George W. Lind, Propulsion, Bethpage, Aircraft
Frank T Mancilla, Elect. Insp., Bethpage, Aircraft
Kenneth T. McSweeney, ILS Eng. Mgmt., Melville, Aircraft
Joseph J. Miglionico, Production, Pt. Mugu, Aircraft
Harold M. Morse, Meas. Std. Lab., Bethpage, Aircraft
Kenneth W. Payne Jr., Mfg. Prog. Mgmt., Melville, Aircraft
George F. Pflugel, Sys. Rel. & Data Anal., Bethpage, Aircraft
John Piccione, ILS Ops. Supt., Bethpage, Aircraft
Harry Saul, Spec., Melville, Aircraft
Eugene N. Stern, ILS Prog. Mgmt., Melville, Aircraft
Alan P. Tyler, A/C Prog., Bethpage, Aircraft
Donald R. Wiggin, AEDC Staff, Oak Ridge, Data Systems
Carl F. Wright, Gen. Comm., Bethpage, Services
Donald Zaleski, ILS Ops. Supt., Bethpage, Aircraft



Tank Painters Deluxe. *If you're ever whizzing down California's Highway 99 between Fresno and Bakersfield look for the Grumman sign. It's up on the 40-foot tall, 200,000-gallon water tank at Grumman Olson's Tulare truck body facility. It's the work of Marvin Johnson (L), who scrubbed the tank and painted it white, and Sal Garcia. Garcia usually paints pinstripes and murals on cars and vans in his spare time. However, these letters are a little bigger than his usual mural. They're three feet high and stretch 33 feet from 'G' to shining 'N'.*

GrummanWorld
February 28, 1986

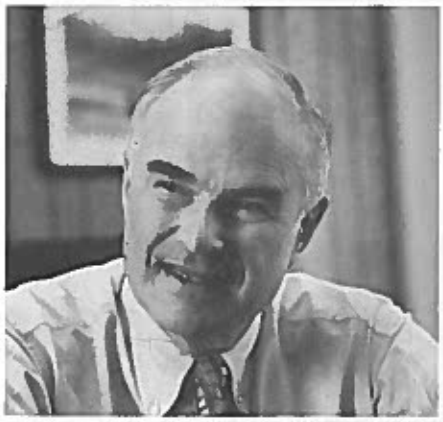
(Photo by Bob Settles)

Stalking High-Tech Data

In the Operations Room, Leo Fisco and Alyssa Boucher monitor the work being performed by computers at the Data Systems' Holtsville Production Center on Long Island. The "Tiger Scope" – named for its red display on black background – is on the right and can divide its display into four sections to simultaneously give data on four different jobs.

Holtsville is the hub of the Data Systems' business computing operations. The facility's brushed chrome exterior and triangular shape catch the eyes of motorists whizzing by on the adjacent Long Island Expressway. Since the center opened in May 1985, the Holtsville staff has grown to about 350 Grummanites.

A Letter From The Chairman



In February, Grumman raised over $200 million through the sale of common stock and a debt offering. Many Grummanites have asked me why we decided to do this.

The first thing to understand is that Grumman is in good shape. In fact, it is the excellence of our position that called for this new financing. We finished 1985 with a funded backlog of $5.4 billion, the largest backlog in our history, and almost double our recent sales volume. However, a number of complicated situations make it necessary for us to raise cash.

The most pressing reason is continuing investment in programs that will be important to us through the end of this century and on into the next. Our F-14D and A-6F development programs are being performed at no profit – but the Navy plans to buy a total of 500 of these upgraded aircraft.

The Consolidated Automated Support System for the U.S. Navy and Intermediate Forward Test Equipment for the U.S. Army have the potential to produce billions of dollars of revenue; certainly these opportunities deserve continued support. Joint STARS for the U.S. Air Force and the Army will also be important to our company's future, and this program has the potential for substantial growth. The Boost Surveillance and Tracking System also requires research and development funding.

These programs may well define the Grumman of the future: but they are very expensive for us right now. The ongoing capital investment program to modernize our facilities and equipment to accommodate this work will cost us $180 million this year.

In addition, the Department of Defense's decision in 1985 to reduce progress payments from 90 percent to 80 percent has created a hole in every contractor's pocket. This change cost Grumman millions of dollars last year – money that could have been spent on our programs.

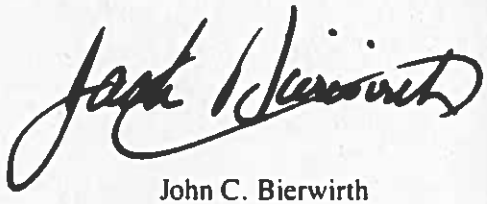
Changes in tax laws are taking their toll as well. The completed contract method of tax reporting did not reduce our taxes, it merely deferred them. Our federal tax payments for 1985 and 1986, for current as well as recent years, will be in the vicinity of a quarter of a billion dollars.

Additional proposed changes to the tax laws could make life for defense contractors even more difficult next year. The Tax Reform Act of 1985 as passed by the House of Representatives would repeal the completed contract method. It would require that taxes be paid on estimated profits from all long-term contracts on a percentage basis as work is performed. This means that Grumman would have to pay taxes on profits, years in advance of any right to receive those profits.

Since 1980 our sales have more than doubled; we have spent our profits on making the company grow. Increasing our capital – keeping a careful balance in the amount we raise through stock sales, bonds and bank loans – is good use of our equity and credit.

Frankly, I think that we can expect our present need for major investments to continue for at least two more years. But we've made some hard choices as to where and how we are going to develop. We're preparing ourselves and our facilities for the Grumman of tomorrow.

All of that effort is going to pay off – for ourselves, for our stockholders, and for our country.



John C. Bierwirth
Chairman

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